Patricia Seybold's Office Computing Group

Editor-in-Chief
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Migration Headache. *The benefits of migrating from proprietary to open systems are attractive, but associated costs are easy to overlook. Migrating applications and data to an open systems platform can cost several times any hardware savings. In addition, there are costs that are intrinsic to any change.*

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Microsoft *and* ***Digital Equipment*** *deepen their partnership to include key elements of distributed computing as well as enhanced customer support. Porting* ***Microsoft's*** *new operating system, NT, to* ***Digital's*** *RISC is secondary •* ***Compaq's*** *withdrawal from the ACE Initiative and SCO shelving Open-Desktop for RISC takes the wind out of* ***MIPS'*** *sails. But ACE has united the Unix community •* ***Letters*** *on SVR4 and OSF/1.*

UNIX IN THE OFFICE

Guide to Open Systems

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HP's Master Plan

Winning Is Everything in Palo Alto

By Michael A. Goulde

IN BRIEF: Over the past two years, Hewlett-Packard has gone from being just another minicomputer vendor to becoming an aggressive challenger of IBM, Digital Equipment, and Sun Microsystems. HP has always been at the leading edge of technology. It was one of the first to use 3.5 inch diskettes, produced one of the first portable computers, was one of the first to popularize object-oriented technology, and was the first to make a strategic commitment to RISC. In many instances, however, it was not able to drive adoption of its innovations as industry standards and had to abandon its efforts and go with the flow of the rest of the industry. HP has learned its lessons well, and now it aggressively pursues having HP technology adopted as the standard throughout the industry. As a result, it is one of the few computer vendors still experiencing double digit growth in revenues and in profits. Even HP's marketing, long the butt of industry analysts' jokes, has become aggressive and effective, creating high visibility for HP's products. Just as Digital Equipment became the preferred alternative to IBM in the mid-1980s, HP is positioning itself to become the preferred alternative to both Digital and IBM in the early 1990s. *Report begins on page 3.*

Migration Headache

There's More Than Meets the Eye

MANY VENDORS of open systems have targeted mainframe users for open systems. Users are told that they will avoid upgrade costs and will enjoy lower costs for service and support and for maintenance. Although in many cases these cost savings do materialize, the picture is far more complex. Users who are considering migrating applications from their existing proprietary mainframe environments to open systems must consider four components that, together, come closer to determining the true cost of migration. These components are:

- The savings enjoyed from acquiring a new Unix system instead of buying a mainframe upgrade
- The cost of migrating from the mainframe environment to an open system
- The cost of infrastructure migration
- The cost associated with changing the computing paradigm, typically from host-centric to client/server and from proprietary to open

AVOIDING AN UPGRADE. Open systems vendors are quick to point out the dollar difference between a mainframe upgrade and the total cost of acquisition and ownership of a RISC-based Unix server or minicomputer. If it were this simple, every MIS director would be a hero. However, this cost saving is deceptive. Incremental costs that must be taken into account are beyond those that would have been incurred either if nothing were done or if the mainframe upgrade were purchased.

SOFTWARE COSTS. The move from mainframes to Unix or other open systems requires not just the investment in hardware, but also investments in new software, planning, and training. Fortunately, mainframe software applications from third parties are becoming increasingly available on Unix. When it is possible to use the same package, applications and data usually port fairly easily. However, this is not always the case. Sometimes the move forces the acquisition or development of new software to substitute for the functionality that was on the mainframe. Internally developed applications almost always have to be rewritten for the new platform. New development tools will be needed and new skills will have to be acquired or taught.

INFRASTRUCTURE COSTS. Moving from a mainframe to a Unix system often requires a new network infrastructure, new system and network management applications and tools, and new skills. Moving from an SNA-based network to TCP/IP can mean a massive investment in everything from wiring to bridges and routers. In addition, new desktop devices will be needed to replace 3270 terminals, and new E-mail and productivity applications will have to be selected, installed, and taught.

COSTS OF CHANGING PARADIGMS. The final component of an open system migration is the change in paradigm and the resulting organizational upheaval. The old rules about who in the organization owns the data and the systems for managing it will change. MIS will be forced to take on a service role with its internal customers. New skills will have to learned. New practices will have to be put into place for application design and development. People will have to change. These are the costs that are most likely to exceed all estimates.

This may sound discouraging, but it is better to know what you're getting into up front. Indications are that, once you've taken the initial hit, significant cost savings begin accruing as you pursue an open systems strategy. Still, *caveat emptor!*

Note: Thanks to George Caneda from BEA Associates, whose presentation at Executive UniForum inspired this editorial. ◐

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HP's Master Plan

Winning Is Everything in Palo Alto

Introduction

While the rest of the computer industry struggles with a worldwide recession, Hewlett-Packard (HP) has been showing surprising results, with both revenues and profits growing at rates higher than the overall market and much better than any of its competitors have achieved. Workstation and computer sales are growing at a healthy clip, and their combined revenue is approximately equal to HP's sales of printers and related supplies. Even so, HP is positioning itself to challenge both Digital Equipment and IBM as a leading supplier of enterprise information systems.

HP has been preparing itself for an assault on the major players in many ways. The company has spent the last two years cutting bureaucracy, accelerating product development, and opening new computer markets ahead of its competitors. It has been able to gain market share in most of the segments in which it competes. Although Wall Street analysts expected HP's earnings to be flat in the first quarter of 1992, new products, along with cost cutting measures, drove earnings up 49 percent to $306 million on a 13 percent rise in sales, to $3.9 billion. As a result, HP's stock price is approaching that of IBM's. This trend has continued in the second quarter, with earnings up 40 percent on a 12 percent increase in net revenue.

Streamlining the Organization

HP has changed significantly in the 10 years since it was cited for a "Management by Walking Around" style described in the book *In Search of Excellence* (Thomas J. Peters and Robert H. Waterman, Jr., Warner Books, New York, 1982). While that style worked in the early 1980s, it is not efficient for the fast-paced 1990s. Company President John Young, working in conjunction with co-founder and Chairman David Packard, studied the organization and dissolved dozens of committees that had previously evaluated all decisions. Young and Packard found that, while the various committees were spending months systematically discussing and evaluating ideas and working toward achieving consensus, significant market opportunities were being lost to faster moving competitors.

In addition to streamlining the decision-making process, HP's organization has been streamlined as well. Since 1989, the company has eliminated nearly 6,000 jobs, or 6 percent of its entire work force, while boosting sales per employee 60 percent over that same time frame. A reorganization changed HP from a company of many different product groups within the information systems business (remember that 20 percent of HP's business is in medical instruments) to a company of just two—one that sells minicomputers and workstations directly to large accounts, and another that sells printers and PCs through dealer channels. Each group is largely autonomous, with its own sales forces, product planning functions, and manufacturing facilities.

However, organizational redesign does not by itself account for HP's current success. Product and marketing strategy, as well as sound technology have played a large role in placing this 53-year-old company in a position of challenging the market leaders in each of the market segments where it competes, capturing leadership in many of them and retaining leadership in segments where it is first.

Vision and Strategy Complement Technology

Vision and Strategy Complement Technology

Before a company can lay out a comprehensive strategy, it first has to have a vision that provides the framework around which to build that strategy. HP's vision is one of open, cooperative computing in an environment that provides:

Intuitive learning and relearning

Information access and sharing

Integration of multiple media

Access to applications

Task integration

In the HP vision, cooperative computing means more than just client/server, reflecting peer-to-peer interaction. This style of computing provides support for three classes of users: builders, managers, and end users, all working in a standards-based, plug-and-play environment.

One of the major foundations of the HP cooperative computing vision is object-oriented technology. It is viewed both as an enabler for providing an information utility and as a means for encapsulating existing environments so historical investments are not lost. HP emphasizes object technology because it provides generic capabilities that can be combined into custom solutions; it provides for reusability which yields productivity; it allows existing relationships to be maintained; it supports a greater variety of data types; and it supports business modeling as a part of applications development.

Standards-Based Architecture

HP's architecture for implementing cooperative computing was formerly known as NewWave computing. However, that name caused confusion with the NewWave PC environment and NewWave Office, and it was dropped. There is nothing remarkable about its form (see Illustration 1). What is remarkable is that HP is making steady progress filling all the blocks with standards-based services and standards-based application programming interfaces (APIs). The goals of HP's standards offensive are to have HP technology selected as industry standards wherever possible, to make that technology available on multiple platforms, and then to sell products that implement those standards within an HP architecture.

HP's Big Bets

Over the past six to seven years, HP has built its future on big bets in six key product and technology areas. Virtually all of HP's strategic initiatives today fall into one of these categories. They include:

User interface technology (NewWave and HP VUE)

Software development environments (SoftBench)

Network and systems management (OpenView)

Application integration services (Distributed Object Management Facility, or DOMF)

Distributed systems services (Distributed Computing Environment, or DCE)

PA RISC (HP 3000, HP 9000 Series 700, HP 9000 Series 800)

These six areas constitute the core of HP's computer and network operations. While in some instances the efforts in different areas may overlap or even be inconsistent in their current form (e.g., the implementation of object-oriented technology is inconsistent in NewWave, Open Object Database (OpenODB), and DOMF), the overall direction appears to be well-thought-out, and HP is working to converge on a single, consistent approach.

HP's Systems Architecture

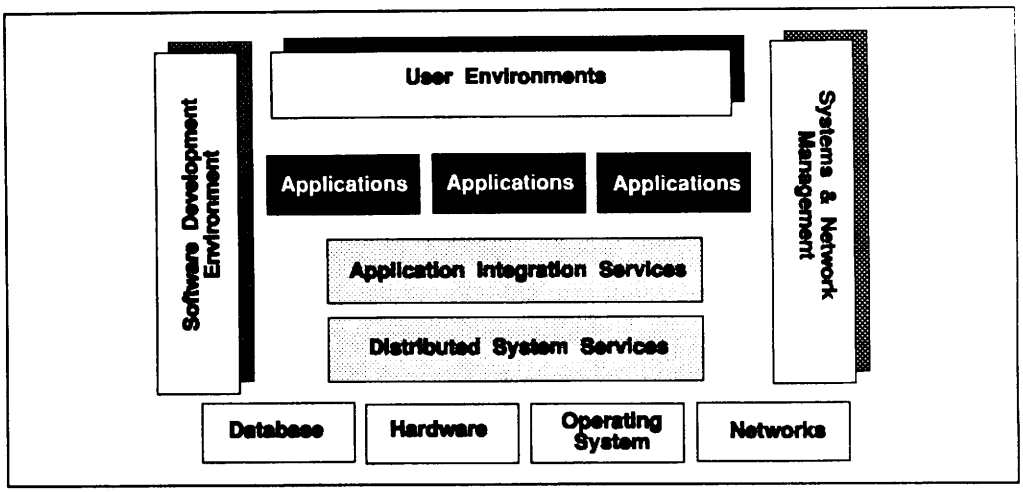

Illustration 1.

Winning with Innovation

HP introduced an avalanche of new products during 1991 and shows no signs of letting up the pace in 1992. Last year, it introduced a new line of workstations and enhanced minicomputers based on a faster PA RISC processor. New printers, the 95LX palmtop PC, and new test measurement instruments were rolled out as well. In fact, approximately 60 percent of HP's orders in 1991 were for products that were less than two years old, compared with approximately 45 percent in 1989. The entire line of HP 3000 and HP 9000 Series 800 minicomputers was refreshed in 1991 with 21 new models. HP was able to accomplish this in part by accelerating the transfer of technology from the workstation division to the computer divisions.

During 1992 and early 1993, two new generations of workstations and minicomputers will be shipped, the first based on a faster PA RISC processor and the second based on the next-generation, super-scalar PA RISC 7100 processor. Performance will improve by 50 percent to 75 percent on most HP systems over the course of the year, and the company intends to continue improving the performance of its systems and workstations an average of 75 percent per year through 1995. New software for system and network management has already been or will be introduced, along with new object-based application development facilities for system and network management applications.

RAPID PRODUCT DEVELOPMENT. Innovation requires accelerated product development. Rapid development brought the 95LX palmtop PC from concept to product in 15 months. This is particularly remarkable because the 95LX represents significant new technology and is not a clone of an existing product or an upgrade to an existing product line. It has taken IBM longer than 15 months just to bring out new configurations of the RS/6000. Rapid development appears across the HP product line, making it tough on competitors trying to keep up the pace.

New Markets Bring New Opportunities

Information Appliances

Senior managers at HP wax poetic at the mention of information appliances. These are easy-to-use personal devices that can access a global network of information resources. The company's interest in information appliances is not without precedent. For many engineers and M.B.A.'s, HP calculators were friends and companions as they learned their trades in school. President John Young was chagrined when he realized that the company's vision of the future of personal computing—a world of portable and specialized devices communicating by wireless networks—did not show up in any of HP's product plans. He believed that capturing an early lead in the emerging market for information appliances which would be easy to use and tailored for particular applications had to be included in HP's strategic directions.

The highly successful 95LX palmtop PC was just the beginning of this effort. In the coming year, there will be customized versions of the 95LX containing specialized databases and wireless communications options. The company has also announced that it plans to build a wireless, interactive television device for TV Answer Incorporated. The box will allow viewers to play along with game shows, order food, and do their banking on a TV set. The HP device will connect the viewer's TV set with TV Answer's back-end services. HP plans to manufacture 1.5 million of these devices in the project's first year, subject to the deployment of the required network infrastructure.

Wireless Networking

We expect HP to further extend both the TV Answer technology and the palmtop technology into the new product category of wireless, personal information devices. Some of the foundations are already in place, and HP has the design and manufacturing capability to take a lead in this market. Strategic investments in communications partners will provide the technology necessary to establish HP's position in the wireless market.

Computer Products Secure Credibility

HP has built its computer business from two roots, proprietary minicomputers (the HP 3000 line) and Motorola-based workstations. HP was not a major player in either of these markets, and even the acquisition of Apollo Computer's Motorola-based workstation product line resulted in a net loss of market share. However, over the last two years in particular, HP has managed to build itself into a worthy competitor and one of the few computer vendors to show healthy sales in the midst of the recession. Although the worldwide minicomputer market is growing only at about 3 percent, HP's sales are leaping at a 25 percent annual rate. When Unix sales alone are considered, the growth rate is closer to 50 percent.

PA RISC the Key

When HP made the transition to RISC technology, most analysts and consultants got a kick out of talking about HP's "RISCY" move. But the success of the computer products based on PA RISC have shown that with RISC, comes return.

There are currently three product lines based on PA RISC:

HP Apollo 9000 Series 700 workstations, which all run HP-UX

HP 3000 minicomputers, which run the HP-proprietary but POSIX-compliant operating system MPE/iX

HP 9000 Series 800 minicomputers, which are physically identical to the HP 3000s, but run HP's version of Unix, HP-UX

Computer Products Secure Credibility

HP is able to achieve tremendous leverage from its research, development, and manufacturing expenses by sharing technology across all three product lines. This ranges from sharing software and chip technology between the minicomputer and workstation lines to sharing entire product configurations between the two minicomputer lines.

The creation of the PRO consortium (See *Unix in the Office,* April 1992) represents an attempt to further advance acceptance of the PA RISC architecture throughout the market. One result of HP's licensing of PRO is that the architecture will begin to appear in other types of applications, ranging from embedded controls to massively parallel systems.

Workstations Lead the Performance Parade

The HP 9000 Series 700 Workstations using PA RISC now constitute more than 50 percent of HP's workstation sales, the balance being the Motorola-based 400 Series that run either HP-UX or the Apollo Domain operating system. The recently announced upgrade program for Series 400 workstations should accelerate customer conversions to PA RISC, opening a migration path to the more expensive, high-end Series 700 machines. The migration will be constrained, however, by the difficulty faced by Series 400 customers and ISVs in porting their Domain applications to HP-UX.

HP's workstation sales comprise both new HP customers and customers buying replacements for older HP workstations. New customers come primarily from Sun's and Digital's market shares and, to a lesser extent, from Silicon Graphics'. We expect HP to continue to erode Sun's workstation market leadership by grabbing new customers away from it as well as by converting some of Sun's and Digital's existing customers to PA believers. (Although HP will win its share of competitive bids against IBM, IBM's installed base isn't large enough to be a target for market share gains.) The performance of the HP 9000 Series 700 workstations continues to win sales for HP, even in the face of announcements of higher-performance SPARC machines from Sun Microsystems.

FAST AND FLEXIBLE. The workstation market is fast-paced, highly competitive, and extremely sensitive to price/performance. The HP workstation group has shown that it is fleet of foot when it comes to engineering as well as marketing. For example, when it was ready to announce the Model 710 at $7,500 and Digital announced a new model priced under $5,000, HP shifted gears smoothly. It whipped together the Model 705, which it, too, priced under $5,000, while offering higher performance than Digital could. It has consistently been responding quickly to product announcements and pricing moves from its competitors with new systems at attractive prices.

HP 3000 Minicomputers

HP's commercial computer business was built from a base of proprietary HP 3000 systems running the MPE operating system. It was these customers who faced the hardest transition when HP migrated to PA RISC in the mid-1980s. HP's ability to retain these customers, in spite of the pain they went through, is a credit both to the company's customer satisfaction programs as well as to its customers' pain tolerance.

Keeping Installed Base Happy. The HP 3000 and HP 9000 business systems are basically the same PA RISC multiuser systems with different operating environments. The current release of the MPE operating system for the HP 3000, MPE/iX, has been brought into POSIX standards compliance for 1003.1 (System Interfaces) and 1003.2 (Commands and Utilities). Porting MPE and its applications to the HP 3000 was the most difficult challenge HP faced in its migration to RISC six years ago. Digital faces the same challenge today in migrating VAX/VMS customers to the Alpha architecture. The key difference is that HP faced this challenge as a pioneer, learning as it went, while Digital is benefiting by learning as much as it can from HP's experience.

As IBM has demonstrated with the AS/400, the proprietary minicomputer business is far from dead. Early in the life of the new PA RISC systems, HP knew that HP 3000 sales would begin to drop off and would be passed by sales of the HP 9000. The expected cross-

over happened in 1991, but HP was surprised to find that MPE customers continued to buy and expand their HP 3000 installations. The HP 3000 product line represents nearly $2.5 billion in business for HP, and it has been growing at an annual rate of approximately 5 percent. Today, approximately two-thirds of the customers for the HP 3000 systems come from within the MPE installed base. Growth in those accounts is primarily due to expansion of the customers' computing requirements, either through new applications or business expansion. On the other hand, the one-third of the HP 3000 customers who are new are mostly small businesses buying at the low end of the product line. This is illustrated by the fact that only one-fifth of the HP 3000 revenue is generated by new customers. To round out the picture of the HP 3000 market, major accounts constitute 40 percent of HP 3000 sales, and over 50 percent of the sales are in the manufacturing sector.

Applications Are Key. There seem to be four factors that appeal to customers purchasing HP 3000s. First is the large applications base provided by approximately 800 Value-Added Business partners who market over 2,000 MPE applications. The second factor is the performance premium offered by PA RISC, which is unchallenged by most competing RISC or proprietary minicomputer offerings. The third factor is that MPE/iX offers source code compatibility with many applications written for older HP 3000 MPE V systems. Finally, the combination of PA RISC and MPE/iX offers OLTP performance that exceeds that of comparable HP9000 machines.

POSIX Benefits the HP 3000 Customer. The inclusion of POSIX compliance in MPE/iX should easily help prolong the life of the HP 3000. Applications developers attracted to PA RISC can develop applications using standard POSIX programming interfaces and deploy those applications on both MPE/iX and HP-UX product lines. Thus, open systems is beginning to bring new applications to the HP 3000 that never would have been made available if developers had to have separate development programs for each platform.

HP 9000 Minicomputers

Sharing the configurations of the HP 3000, the HP 9000 line of minicomputers has allowed HP to capture a leadership position in commercial Unix in terms of dollar shipments. HP has taken HP-UX, its Unix operating system based on System V Release 3, and enhanced it with features that give it the reliability, availability, and security features required for commercial applications. Included in the commercialization effort are many applications that fall under the OpenView program, such as OpenSpool, OmniBack, and PerfView. In addition, the systems are configured with battery backup, and HP offers a worldwide 24-hour, seven-day-a-week support network through its Response Centers. These are all requirements that commercial customers look for in midrange business systems, which are often not found in basic Unix computers.

The Mainframe Alternative Program

Much of HP's success with the HP 3000 and HP 9000 can be attributed to aggressive market programs that are tightly focused on specific business opportunities. For example, an important strategic market segment is the IBM mainframe customer. One of HP's strategic initiatives is an effort to surround the mainframe with smaller HP systems functioning as servers that support users and draw on data stored on the mainframe. Another is a more blatant downsizing strategy called the Mainframe Alternative program, a multifaceted effort initiated in January 1991. In its early stages, it was targeted at Fortune 1000 mainframe shops and special teams were formed to focus on the project. Initial target sites included HP customers who were also users of older IBM 43xx processors reaching the end of their useful life. These customers were facing the choice between costly upgrades to more powerful, IBM mainframes or a search for other alternatives. HP sought to attract these customers into lower cost, high performance, open alternatives.

The Mainframe Alternative Program

Keep the Software, Lose the Hardware

Mainframe users are confronted with significant and expensive application migrations if they move from their IBM environments to PA RISC machines. The cost of software migration without adequate tools and facilities would have offset any benefits they would realize from avoiding the purchase of the mainframe upgrade. Recognizing this, HP formed strategic relationships with a number of key mainframe software suppliers to ensure that the necessary expertise and tools would be available to help customers migrate. Tools such as Conveyor, licensed from Infosoft by system integrator Innovative Information Systems Incorporated (IISI), and VISystems' VIS/TP conversion tool, Cobol compiler, and CICS translator have been made available on HP platforms to facilitate customer migrations.

In its first year, the Mainframe Alternative program resulted in over 50 IBM mainframe sites installing HP RISC systems instead of purchasing mainframe upgrades. These customers reported savings ranging from $30,000 in the first year to more than $1,000,000. Losing this amount of revenue to HP's RISC systems is bound to get IBM's attention before too long.

Providing Mainframe Applications

Implementing an open systems alternative to mainframes with the HP 9000 required that software familiar to large accounts be available on the HP systems. HP invested major financial, technological, and human resources to attract MIS-class applications to its program. Software AG (SWAG) and HP have a joint development effort to make many of SWAG's Unix-based products available on the HP 3000 MPE/iX system. ADABAS, Natural, and Network will be ported as by-products of SWAG using HP 9000 and HP-UX as their development platform for porting the products from the IBM mainframe environment. The POSIX compliance built into MPE/iX contributed to allowing SWAG to easily move to the HP 3000. Other traditional mainframe-class software vendors are also participating in HP's program, including Cincom, SAS, and Information Builders Incorporated (IBI).

Raising the Ante: Corporate Business Systems and Servers

HP's ability to provide mainframe-class performance was upped a notch with the announcement in May of the HP 3000 Corporate Business System 990/992 and the HP 9000 Corporate Business Server 890, the next generation of HP servers and multiuser systems. These high throughput systems, formerly code-named Emerald, are identical hardware designs, differing only in their respective operating environments. They are available in configurations ranging from one to four processors. All multiprocessors are symmetric. Performance improvements in these systems come from many sources. The processors are 20 percent faster than those used currently, running at 60 MHz instead of 50 MHz. Secondary cache size has been increased to 4MB (2MB instruction, 2MB data). There is a significant boost in system throughput as a result of an increase in memory bus bandwidth from 100 MB/s on the older models to 1 GB/s. Throughput for I/O has also been increased both by increasing bandwidth from 7 MB/s to 32 MB/s and increasing the number of I/O channels that can be configured—now up to eight. Both systems can support memory configurations up to 2 GB (current VAXs have a VMS-imposed limitation of 512MB of memory). The new HP 9000 systems will feature the first appearance of HP-UX 9.0.

Dramatic Performance Improvements Result

Performance for these new systems should be at least double that of the current generation. The design goal for the top of the line four-way symmetric multiprocessor is for between 300 and 400-plus transactions per second for TPC/A benchmarks. While the actual benchmark is not yet available, there is strong reason to expect that HP will be able to deliver at least close to that performance on these systems. The good news for the competition is that these systems will not be available until October. The bad news is that HP will roll out another high-end refresh early next year with the introduction of systems based on the PA 7100 processor (See *Unix in the Office*, April 1992). Design plans call for the introduction of 8-way systems by the end of 1993 and 12- to 16-way systems within a few years after that.

The new systems are being introduced with support for the StorageTek 42xx Series of 3480-compatible cartridge tape drives. These devices provide the kind of high-speed, high-capacity tape backup that mainframe customers expect, adding to HP's pitch for its systems as a mainframe alternative.

HP will now be able to further extend the performance of its commercial systems even deeper into the IBM mainframe product line than it now does. The new systems will offer performance "similar to" that of an IBM 3090 Model 600J. The currently available HP 3000 Series 980/200 has been said to be comparable in performance to the IBM ES/9000 Model 440, but it sells for less than half the system price. The ES/9000 Model 340 is comparable to the HP 3000 series 980/100, which is less than a third the system price. The water-cooled ES/9000 Model 340 is 10 times larger than the air-cooled HP machine.

Other Key Commercial Initiatives

Open Software Environment

The Mainframe Alternative program is supplemented with a consulting service called the Open Software Environment. This program is aimed at the Fortune 500 and helps users create a non-vendor-specific "road map" for implementing an open systems approach to data processing. At the end of each project, the customer is provided with a two- to five-year plan in the form of a solution. The solutions aren't necessarily limited to HP products or those of HP VARs, but are probably influenced by HP's technological biases.

Software Partners

HP recognizes that the success of its assaults on IBM and Digital will depend on whether or not applications popular in their customer environments are available on HP systems. An example of HP's pursuit of those applications is the recently announced agreement with Ross Systems. This is a joint marketing and development agreement under which Ross, a well-established provider of financial, distribution, and process manufacturing applications for manufacturing companies in Digital VAX/VMS environments, will create an HP subsidiary to develop and market software for both HP-UX and MPE/iX environments. As a part of the agreement, HP will provide Ross with development and demonstration systems and with technical assistance. HP will also provide over $500,000 to Ross for both the conversion of Ross Systems software and the establishment of a marketing and distribution organization called Ross Systems HP.

A Digital Cooperative Marketing Partner since 1984, Ross will manage its HP and Digital subsidiaries as separate organizations. These may, in fact, compete against one another when HP and Digital are competing for an account. For a software provider, this arrangement means a win, no matter which vendor is selected by the customer, although it will increase Ross's cost of sales. This represents one of the side effects of open systems for software suppliers—managing relationships with competing vendors when applications run identically on multiple platforms.

HP Is the Workstation Performance Metric

HP's workstation division was justifiably proud when it introduced its PA RISC-based workstations in 1991: the performance of those systems set new standards for performance in the industry. Existing Apollo and HP Motorola customers had less to be joyful about, however, since they faced the choice of migrating to the new architecture, changing vendors, or keeping their increasingly outmoded machines. A software migration strategy was announced that would bring the Apollo customers into source code compliance with the PA RISC machines, but customers were not entirely mollified. As a result, hardware upgrades were added to the software migration program in an effort to satisfy the Motorola installed base.

HP Is the Workstation Performance Metric

Series 400 to 700 Migration

Targeting the installed base of approximately 60,000 HP Apollo workstations, the latest release of Domain/OS is to be the last major-features release. From now on, there will only be maintenance releases and some minor enhancements. However, customers can switch CPU boards on the Series 400 workstations to a PA RISC Model 710 CPU with a SPECmark rating of 49.7. This upgrade should result in a tenfold performance increase in some cases. Users retain all their RAM, internal disks, and monitors, protecting a reasonable part of their hardware investment since upgrading is more cost effective than buying a new system. The upgrades begin to be available this summer on Model 425e; availability for 400dl, 400t/s, and 433s start next year. The upgrades are priced from $6,000 to $8,000, less than the cost of a new Model 710. Some customers, to avoid software porting, may choose the Motorola 68040 upgrade that HP has made available.

Software Migration Strategies

Domain/OS users can switch to HP-UX through a trade-in program that is free of charge to subscribers to the software maintenance program and is offered at a nominal fee to others. In addition, a migration tool kit was announced to assist in moving Domain applications to HP-UX. The kit includes a source-code scanning tool that enables users to port C and Fortran programs to POSIX-compliant HP-UX and software that helps managers switch from Domain Windows to X Window graphics that run on HP-UX. The degree of difficulty of this effort depends on how dependent the application is on Domain's proprietary system calls. However, most third-party applications that were running on Domain now have HP-UX versions.

In addition to aids for porting applications, HP is providing interoperability tools to users who have both Domain and PA RISC machines. DMX, an X Window-based windowing and editing environment based on the original Domain/OS Display Manager, will be available on HP-UX as well as Domain/OS in June. Interoperability is also facilitated by the fact that HP VUE, the Motif-based desktop, is common to both operating systems.

Next-Generation PA RISC

The next generation of the PA RISC architecture, the 7100 processor, will be a superscalar, single-chip implementation. Compared to current HP 3000 and HP 9000 systems, systems based on the new processor are expected to deliver up to 50 percent more CPU performance. The 7100 will first appear with a clock speed of 100 MHz, nearly double the speed of the processor used in the recently announced high end HP 3000 and HP 9000 products. HP projects a SPECmark performance of up to 120 which is almost 50 percent higher that the 76 SPECmarks it is able to achieve with its current processor. HP has indicated an intention to roll over its entire product line to the new processor by the end of 1992 or early 1993, inlcuding new systems as well as upgrade boards for existing systems.

No significant price increases are expected on the new HP systems, which means that customers will receive up to 50 percent improvement in price/performance with the new and upgraded HP systems. This, combined with performance leadership challenged only by Digital's first generation of Alpha systems and perhaps Sun's SuperSPARC, should make 1993 another good year for HP.

HP-UX to OSF/1 Migration

HP is in no hurry to migrate to OSF/1. This may seem to be an odd strategy for one of the founders of the Open Software Foundation (OSF), but it in no way demeans HP's support for the overall goals of the OSF. While Motif, DCE, and DME are critical pieces of HP's strategy, the company has achieved dramatic success with HP-UX in the commercial Unix marketplace. HP believes that its customers don't care whether the kernel is OSF/1 or HP-UX, but they do care that the operating system is robust and provides them with the functionality to support the reliability and high availability necessary for business-critical applications. We expect HP to take a wait-and-see attitude before committing to a full-scale migration to an OSF/1 kernel.

Object-Oriented Directions

Several efforts are underway within HP to incorporate object-oriented technology in its products. Object technology plays a key role in HP's OpenView products and in the OSF's DME, which contains a lot of HP technology. HP will continue to evolve its products in a direction consistent with DME, as discussed below (see "OpenView Manages Network Complexity").

The other areas where objects are important for HP are on the desktop, in the form of NewWave for DOS and for Unix, in its joint development work with Sun on the Distributed Object Management Facility, and in its work on the Open Object Database (OpenODB).

HP's overall road map for distributed object computing is its Distributed Application Architecture (DAA), although some individual products don't seem to map into it in an obvious way. DAA defines a framework for application integration services that allow users to access and exchange information over the network. See Illustration 2 for the structure of DAA.

Distributed Application Architecture (DAA)

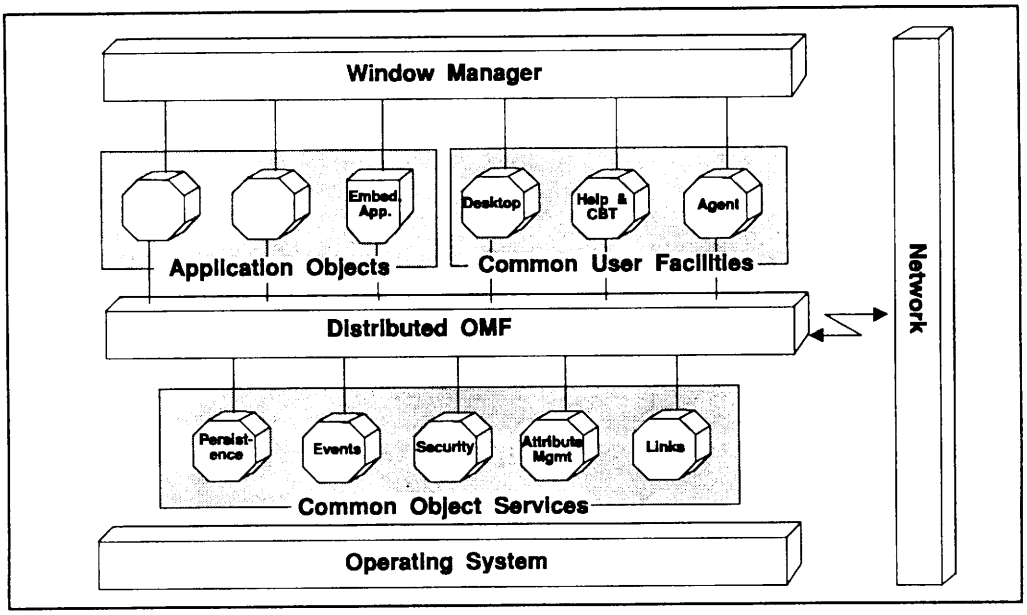

Illustration 2.

NewWave for DOS

NewWave, first announced in 1987, is the user environment component of DAA. For many, it was their first introduction to object-oriented technology. In its initial form, NewWave managed objects only on the individual PC. HP recognized that management of distributed objects would require industry agreement on standards and worked to help found the Object Management Group (OMG) in 1989. The architecture proposed by the OMG was very consistent with the architecture introduced with NewWave.

However, only about 225,000 units of NewWave for DOS, which was first available in September 1989, were shipped by the end of 1991. In fact, a majority of the units sold were shipped in 1991. HP licenses NewWave to NCR, Data General, and Sony, all of whom use it as a part of their strategic user envrionments. However, Microsoft has never been a strong supporter of NewWave's programmatic interfaces or object model. This, in addition to the absence of solid industry standards for distributed object management, as well as the threat

of the Apple lawsuit, have all worked against HP achieving widespread support and adoption of NewWave.

However, HP continues to evolve NewWave and in March 1992, Version 4.0 for PCs was introduced. In this release, the agent facility has been enhanced so that it can be event driven. Version 4.0 also supports Windows DLLs, allowing any agent task to call up a second Windows application. DDE support now allows applications under agent control to share information. NewWave 4.0 represents a convergence of the NewWave API and Microsoft's Object Linking and Embedding (OLE). Most developers will now write to the OLE API instead of the NewWave API, and in the future, HP will get out of the desktop API business, leaving Windows APIs up to Microsoft. Since OLE was the issue that made Microsoft balk at giving HP full support, we expect Microsoft will warm up to NewWave more now.

Distributed Object Management Facility

The DOMF was HP and Sun's joint submission to the OMG's request for proposals for an Object Request Broker (ORB). It bears little resemblance to the Object Management Facility in NewWave for DOS. The heart of DOMF is the Class Definition Language (CDL), which is a common facility that allows developers to write remote procedure call (RPC) stubs that can be used either with HP's Network Computing System (NCS) RPC or with Sun's Open Network Computing (ONC) RPC. The function of the CDL is to generate code that can be compiled into multiple RPCs.

Since HP and Sun wanted the widest possible latitude in implementing whatever distributed object management standard the OMG decided upon, the two companies decided against implementing their DOMF as a framework like Digital's ACAS and HyperDesk's ORB. Instead, the DOMF is specified as a set of basic object activation and location services, communications services, and a high-level interface, the CDL.

HP and Sun are developing their own separate implementations of the DOMF, which are interoperable, but which differ in two key ways. First, at a general level, HP and Sun developed their DOMF implementations to address different applications requirements. HP's goal was to support object interaction across very large networks. Sun's target environments are smaller in scope. Second, the two implementations use different naming and binding methods. In spite of their differences, HP and Sun will continue to work together as they evolve the DOMF.

DOMF ARCHITECTURE. HP's DOMF implements a hierarchical object management service. This service comprises four management levels, each containing information to help objects find other objects across many machines and networks. The four management levels begin at the lowest level, with the DOMF Run-Time Library and/or object managers. The next highest level is the Manager of Object Managers (MOM). The MOM stores information about the contents of two or more object managers and/or storage domains. Then comes the Object Region Expert (ORE), which stores information concerning the storage domains for which each MOM is responsible. Finally, at the top of the hierarchy, is the Manager of Object Region Experts (MORE), which stores information concerning the MOMs for which each ORE is responsible. The MOM, ORE, and MORE are provided using HP's Location Broker. DOMF will be available in the second half of 1992. HP is also talking to a number of platform vendors about licensing DOMF in much the same way it licenses OpenView and SoftBench. Efforts are also underway to make DOMF facilities available within NewWave. DOMF will be available to OEMs in the third quarter of 1992, and software developer kits (SDKs) will be available in the first quarter of 1993.

OpenODB

OpenODB is not a true object database, but one that builds on a relational foundation to accommodate more complex data types. It introduces Object-Oriented SQL as a means of accessing object data and of helping to move users toward the object-oriented paradigm. OpenODB is currently provided as a layer on top of HP's Allbase database. HP is in

negotiation with other vendors of RDBMSs to use the OpenODB as an object-oriented storage and access interface.

OpenView Manages Network Complexity

OpenView and DME

In typical HP tradition, OpenView is both an architecture and a set of products. The recently released OpenView 3.0 represents a step closer to HP's goal of preparing OpenView to be compliant with OSF's DME, since DME is based on technologies submitted by HP as well as others. OpenView supplies integrated network and system management for multivendor distributed computing environments and the offering includes management applications from HP as well as from third parties. Both IBM and Groupe Bull have licensed OpenView technology for their Unix platforms.

The HP OpenView SNMP Platform now includes the HP OpenView Windows API as well as continued support for the direct SNMP API. The SNMP Platform includes dynamic network discovery and layout features that locate and display devices on the network. The Windows API in SNMP Platform is the one which was selected by the OSF for inclusion in the DME.

The OpenView Distributed Management Platform includes the all of the features of the SNMP platform plus an additional communications infrastructure that includes the Common Management application programming interface (CM-API). CM-API provides access to both SNMP and CMOT, and has an OSI option that provides CM-API access to CMIP. The Distirbuted Management Platform has an SQL option that is based on the Ingres relational database. This option allows reports to be generated based on database queries instead of having to create reports which are based on lengthy and detailed log files. The Consolidated Management API from OpenView was selected both for OSF's DME and for X/Open's management protocol (XMP). HP is actually delivering Groupe Bull's implementation of CM-API through a technology cross-licensing agreement between the two companies. This agreement gives Groupe Bull access to HP OpenView components, and gives HP access to Groupe Bull's implementation of the CM-API.

The Distributed Management Platform will be available in the third quarter of 1992, but the OSI option won't be available until the fourth quarter.

HP OpenView Management Applications

Management applications provided by HP include Network Node Manager 3.0, OpenSpool, OmniBack, Omniback/Turbo, and PerfView. These applications can be expected to be made available on other platforms on top of DME.

Network Node Manager 3.0. An end-user network and system management application, OpenView Network Node Manager gives system administrators broad control of a distributed TCP/IP network. A system administrator can monitor a company's LAN and perform fault, configuration, and performance management functions from a single workstation. The Manager incorporates the features of OpenView SNMP platform and uses a GUI front end. It includes an application builder that allows managers to build graphical management applications quickly without programming.

OpenSpool/UX. HP's spooler solution for managing shared printers and plotters, OpenSpool/UX, can send and manage print requests; display status; manage devices, queues, and systems; and configure realms, devices, queues, forms, fonts, and journals. It is based on a client/server architecture in which the server module accesses and manages devices while the client component provides both menu-driven and command-line interfaces. OpenSpool/UX clients and servers may be on either the same or different systems.

Used in conjunction with LAN Manager/X, OpenSpool can support PC as well as Unix clients. Recent enhancements include support of mixed HP-UX and Sun environments (SunOS 4.1.1) and even homogeneous Sun environments. Also added has been print device sharing between HP OpenSpool and LAN Manager and the forthcoming Nether/9000 product. In addition, support has been added for Japanese/Kanji, French, German, and Spanish.

OmniBack and OmniBack/Turbo. Backup services have always been a shortcoming of most implementations of Unix. HP's answer to this problem is OmniBack, a global network backup management solution providing central file system backup and recovery. It automates the backup process from any system on the network for all machines in a distributed environment. In addition to traditional backup and recovery functions, it provides scheduling and journaling facilities. OmniBack is DCE-ready since it is based on the Network Computing Services (NCS) RPC. OmniBack/Turbo is aimed at midrange and high-end systems in networked environments, delivering high-speed backup with throughput up to 12 GB per hour.

OmniBack/Turbo is a high-performance solution that is particularly well-suited to database backup through its ability to access raw disks. A new release of the product allows online backup of Oracle databases, eliminating the need for offline database backup.

It addition to supporting all HP-UX and Apollo Domain systems, a recent release of OmniBack/Turbo has added support for Sun systems. That release has also added support for central backup of LAN Manager and NetWare PCs by integrating software from a third party, Quest. This enables centrally controlled PC backup, eliminating the need for user intervention.

OpenView System Manager. System management for the MPE/iX environment is provided by OpenView System Manager which supports up to five management consoles. With Release 3.0, HP has added task-based filtering of events, automated response to messages, and links to other applications which allow the MPE/iX message catalog messages to communicate with System Manager. OpenView System Manager supports management of networks of HP 3000 computers. OpenView Console is similar to System Manager, but it does not manage networks of machines. Currently, it is only available as part of a deluxe HP 3000 Corporate Business System package.

PerfView. PerfView is a performance monitor that interacts with node-level diagnostics, reacting to site-level alarms for management by exception and using node-level intelligent data-capture capabilities. Active site-performance management is provided by a combination of historical trend analysis, alarm and event analysis, environment modeling, and performance prediction. Managers can use PerfView to isolate and characterize system performance problems in complex systems by narrowing the problem down to one node and then making use of lower-level node systems to isolate the specific problem. Running in conjunction with OpenView, PerfView can generate results in graphic form by using OpenView's mapping capabilities. The performance of other vendors' equipment will be able to be monitored by PerfView using data collection technology that HP will supply.

OpenView Resource Manager

HP OpenView Resource Manger/DOS can analyze real-time information about multivendor devices to help network administrators predict and plan for changes in network traffic. It collects and analyzes information about multivendor hubs, bridges, and routers on Ethernet LANs and then graphically presents statistics based on that data.

Multiprotocol Routers

HP manufactures three router products, the ER, CR, and TR. All three handle the five major routing protocols: TCP/IP, DECnet, Novell IPX, XNS, and AppleTalk II, and can be managed by OpenView. The ER has two Ethernet and two WAN ports. The TR has one

Ethernet port, one Token-Ring port, and two WAN ports. The CR is expandable to support two to eight Ethernet ports, one to four Token-Ring ports, and up to 16 WAN connections.

EASE and Network Management

HP has begun to find ways to leverage its instrumentation expertise in the networking arena. It recently implemented technology from its instrumentation division that imbues its entire line of local area network bridges, routers, hubs, and cards with network data-gathering intelligence. Many existing HP network devices can be upgraded for a nominal charge to do their own reporting of network errors and traffic levels to HP's OpenView network management platform saving users from installing LAN monitors at each site. The software, called the Embedded Advance Sampling Environment (EASE), is a sampling algorithm developed in HP's labs. It can be supported by all of HP's EtherTwist products; the user only needs to load the applications that make use of the sample data collected. HP has no intentions of licensing the EASE technology to other network equipment vendors.

Third-Party OpenView Applications

Many third-party applications are available for OpenView in the areas of multiprotocol network management, network device management, physical asset and wire management, planning and simulation, problem management, security, system management, and system and network performance. These third-party applications complement the OpenView environment, although, in some instances, only by virtue of supporting common standards. In other instances, HP remarkets the third-party application under its own label.

SNA Connectivity Plays Strategic Role

Also announced in Spring '92 was a new SNAplus client/server architecture that allows a mixture of workstations, midrange systems, and servers on an Ethernet LAN to access a variety of SNA environments through a single server and communications link. This approach simplifies and rationalizes HP's previous collection of SNA connectivity products.

This approach should also lower the overhead of running SNA on multiple HP 3000 and 9000 hosts. The SNAplus products include SNAplus Link, the basic SNA software and interface hardware, client/server software that supports 3270 and 3278 terminal emulation, LU6.2 peer-to-peer connections, and HLLAPI for automating data transfer and host log on procedures.

Systems supported include HP Apollo 9000 Series 400 and 700 workstations, HP 9000 Series 800 servers. SNAplus systems can send alerts and alarms to OpenView, IBM's NetView, and SNMP-compliant network management systems.

Future plans for IBM connectivity include supporting APPN protocols (see *Unix in the Office*, April 1992), and support of IBM's 5250 terminal protocol for the AS/400 by early 1993. Phase 2 of HP's SNAplus roll-out should occur by the end of 1992, and will provide TRN connectivity between SNAplus servers and IBM systems as well as support for IBM's Qualified Link Level Control protocol for running SNA over X.25 packet-switched networks. During the first half of 1993, HP will extend SNAplus to other HP systems, including Apollo Domain workstations and HP 3000 Series 900 MPE/iX systems as an enhancement to existing SNA support.

OpenView Gives Users a Leg up on DME

Users are picking HP's OpenView network management system because they perceive it as giving them an inside track to OSF's DME and as being closer to standards than other schemes. They believe that HP will have an easier time migrating to DME. HP's support for DME will come in stages, beginning first with the components that were originally submitted by HP. OpenView's APIs will be maintained, so the swapping of underlying services, such as replacing HP's Event Management Services with DME's Banyan Network Logger, will go unnoticed. Porting OpenView has given HP a lead over SunConnect, whose SunNet manager remains a Sun-only network manager. However, SunNet manager has a distributed architecture, while OpenView management functions are centrally managed, a point which may not sit well with aficionados of distributed computing.

Mail Plays a Strategic Role

HP OpenMail

Mail and messaging capabilities have become an increasingly important component of customers' infrastructure and applications. HP has an aggressive strategy in this area with its OpenMail products and, to date, it is one of the few vendors delivering GOSIP-compliant X.400 messaging. HP OpenMail provides a messaging backbone that features a scalable mail engine along with suitable user interfaces at the respective desktops supported. The backbone is based on the OSI X.400 standard for exchanging messages between mail systems. OpenMail has been integrated with HP's X.400/9000 Message Transfer Agent, which allows users to exchange information in multivendor environments, including proprietary X.400-based E-mail systems such as IBM's PROFS and Digital's All-In-1. OpenMail provides a choice between OSI and TCP/IP transports that allows X.400 to be added as needed without upgrading the software.

MULTIPLATFORM AVAILABILITY. Porting OpenMail to run on other vendors' platforms has been a central part of the HP strategy. It currently runs on AIX, SCO Unix, Ultrix for MIPS, and Sequent Symmetry and during 1992, OpenMail will also be ported to NCR, Sun, Pyramid, MIPS, Ultrix for VAX, AT&T, and Unisys. Some of these ports have been done through strategic agreements with other vendors, such as office system vendor UniPlex, which ported OpenMail to the IBM RS/6000 and the DECstation 5100 workstations. UniPlex will also incorporate OpenMail into the UniPlex engine for E-mail capabilities.

OTHER SERVICES. HP is also providing an X.500-based Distributed Directory. It provides a common enterprise-wide directory for E-mail addresses, phone numbers, and other information that can be accessed by other applications as well as users.

HP is concentrating its efforts on the mail engine and products that implement standards-based services. In many areas, it is looking to third parties to fill in the gaps, like Touch Communications' Worldtalk PC E-mail gateway between the HP 9000 and Microsoft Mail and Lotus's cc: Mail. It also plans to deliver gateways to MHS, QuickMail, and Lotus Notes.

MAKING MAIL AFFORDABLE. Recognizing the potential for large-scale installations of mail, HP is trying to keep the cost per seat down to a minimum. HP estimates that the typical cost of ownership for OpenMail is $519 per user per year, including licensing, support, training, administration, and maintenance costs.

Summary

There is no doubt that HP has been on a roll. It made several "bet the company" decisions in the mid-1980s and is reaping the benefits of its foresight and vision today. Commitment to Unix was made early, and HP is now a recognized leader in commercial Unix and a serious challenger to Sun in the technical workstation marketplace as well. It moved from CISC to RISC before RISC was popular, and it successfully committed to supporting its proprietary operating system as well as Unix, a challenge Digital faces today.

Challenges Remain

HP is not without its challenges. Its personal computer operation is profitable, but its performance-oriented PC strategy has to compete with dozens of lower-cost manufacturers. The NewWave environment for Windows has never caught on across the industry and has not been strongly supported by Microsoft. PA RISC faces a challenge in 1993 from Digital's Alpha-based workstations and minicomputers. There are no longer any big hits in the cost reduction area, either. Can HP find areas for continued growth, and are information appliances one such area?

Summary

HP believes that, by driving adoption of its object-oriented distributed computing technology by consortia for inclusion in open systems products, it can become the leading provider of those products. However, having turned over its proprietary jewels, it faces the risk, of some other vendor providing a cheaper, faster, or otherwise superior implementation.

HP's reliance on Unix for continued growth depends on the continued evolution of Unix environments that can offer reliability, security, integrity, and manageability features that rival mainframe environments. Perhaps the biggest threat to HP's strategy in this area are the POSIX standards, which allow non-Unix operating systems to offer interfaces and services compatible with those offered by Unix.

Aggressive Marketing Could Oversell

HP must also be careful of overselling the benefits of downsizing and migrating to open systems without fully apprising its customers of the costs they will face. While HP systems may be cheaper than IBM mainframe upgrades or offer better price performance than their competitors' systems, there are other significant costs associated with any migration. (See Editorial, this issue.) These costs depend largely on the approach that is taken. While it is becoming increasingly possible for customers to run the same third-party software on HP systems that they had been running on their mainframes, it is not possible in every case. In those instances where the software is not available, applications would have to be significantly modified or even redeveloped from scratch. In other cases, software might have to be ported, data must be migrated, systems managers and programmers must be retrained, and in some cases, an entirely new infrastructure must be put into place. For example, Ethernet does not run well over SNA networks. All of these efforts add costs to downsizing and migrating to Unix that far exceed the simple cost of hardware acquisition.

Looking Ahead

HP will continue to push the envelope on performance with all of the supplementary capabilities that the most demanding customers require. Looking ahead, HP will continue to harden system software and work toward developing a capability described as "distributed disaster tolerance"—or tolerance for multi-site disaster situations. This is available now as a part of Netbase for the HP 3000, and it will be expanded as a part of SharePlex Facility/iX. Similar functionality will be made available on the HP 9000 in the future. Further ahead, by 1994, HP will build fault-tolerant capabilities into its systems in areas like memory arrays, automatic reconfiguration of the system on processor failure, and provision for online channel maintenance. Even further out are plans for redundant power supplies, automatic system diagnostics, and online component repair. While individual areas of capability can be found piecemeal in other vendors' systems, HP is bringing all this capability together within a single system, which is impressive.

HP is confident, self-assured, and profitable. In some ways, the biggest threat facing the company is that it won't be able to consistently deliver the kind of quality service and support that customers will expect along with its products. The technology of distributed open systems is complex and requires large numbers of well-trained employees to make it work. Can HP match the quality of products and technology with the quality of its people?

Next month's *Unix in the Office* will address
Digital's DECworld Gems.

For reprint information on articles appearing in this issue,
please contact Donald Baillargeon at (617) 742-5200, extension 117.

Open Systems: Analysis, Issues, & Opinions

Vendor Focus: Microsoft and Digital

Microsoft and Digital Enter Strategic Relationship

The news that Microsoft and Digital Equipment had formally agreed to work together to port Windows NT to the Alpha architecture was expected ever since Digital started the Alpha striptease last winter. What was surprising to many, and missed by an equal number, was the breadth of the cooperation announced between the two companies.

Three Areas of Focus

Digital and Microsoft announced that they have agreed to work together in three general areas:

1. Bringing Windows NT to Alpha. Digital is offering to license Alpha to the industry, and Microsoft will offer NT on Alpha to the industry.

2. Enhancing Digital's Network Application Support (NAS) services and Microsoft's Windows Open Services Architecture (WOSA) to provide common elements that will assist developers in providing distributed applications.

3. Expanding the service and support relationships between the two companies to provide customers with comprehensive support for Digital and Microsoft products.

These agreements bring Microsoft's desktop operating system technology, its set of de facto standards, and its popular Windows personal productivity applications together with Digital's infrastructure, worldwide networking capabilities, and service offerings in an attempt to supplement each other's weaknesses and strengthen their respective positions in the market.

NT on Alpha: Irony for the '90s

The real irony of Microsoft porting NT to Alpha is that the architect of NT, David Cutler, is a former Digital engineer who headed up a RISC development project at Digital in the mid-1980s. This project included plans for a portable version of the VMS operating system, but the project was canceled when Digital decided to go with the MIPS RISC processor instead of rolling its own. Cutler left Digital and went to Microsoft to head up development on portable OS/2, work which evolved into NT. Now, Cutler's new operating system has come home to roost on Digital's new RISC architecture.

Microsoft's arrangement with Digital is nonexclusive. There is nothing to prevent Microsoft from porting NT to other processors in addition to the three already supported. However, Microsoft has become very fussy about the strategic partners it selects after the IBM experience. Basically, Microsoft prefers not having partners who have competing desktop operating system software. Particularly unsuited are hardware vendors with RISC architectures that also develop desktop operating system software for those architectures which compete with Microsoft's software. IBM, with the Power Architecture and Pink, falls into this category, as does Sun with SPARC and Solaris.

Since Hewlett-Packard doesn't do its own system software, its PA architecture would seem to be a likely candidate for NT, but Microsoft perceives HP as too pro-Unix for its taste. In Digital's case, since VMS, Digital's flagship operating system, does not represent mass market desktop competition for NT, Microsoft doesn't perceive any threat.

Behind Microsoft's Alpha Commitment

The promise of Alpha for Microsoft is scalability and penetration into large corporate applications. Microsoft would prefer to have more vendors building Alpha systems for NT to run upon, considering its penchant for high volumes, but since Digital is willing to license and sell Alpha, Microsoft may be able to help Digital find some Alpha partners.

The extent of Microsoft's commitment to NT is shown by the inclusion of an Alpha compiler and development tools in Microsoft's Software Developer's kit for NT along with compilers for Intel and MIPS. Developers will write an application to the Win32 API and then use the appropriate compiler to produce a binary for each

architecture. A developer doesn't have to worry about the specifics of the hardware platform or drivers; NT takes care of all the details.

Microsoft will make its Windows applications available on Alpha and Windows NT, which will also support DOS and 16-bit Windows application binaries through the use of an emulator. On its part, Digital will port its DECtp Desktop for ACMS transaction processing client, environment, and Pathworks to all NT platforms. Digital's eXcursion X server will be supplied by Microsoft for interaction with X-based applications. This is sort of halfway support, since Microsoft would have to support X client development on NT to fully join the X Window world. However, Digital, with its knowledge of the X Window System, POSIX, and other open systems standards, may be able to help Microsoft overcome its reputation for being standards-indifferent (at least, when it comes to non-Microsoft-defined standards).

NAS Meets WOSA

The second part of the agreement is the most interesting from an open systems perspective. Microsoft and Digital will work to bring the application programming interfaces (APIs) used in NAS and in Windows Open Services Architecture into synchronization so that developers of Windows applications will have a common set of APIs to use in building Windows and NAS applications. This means that Microsoft's productivity applications will work with Digital's enterprise information utility in providing access to information. As a result, Windows applications will interact in a more reliable and consistent way and make better use of NAS services, thereby increasing the value of both Microsoft's applications and of NAS.

For example, the database access interfaces from the two companies, Digital's SQL/Services and Microsoft's Open Database Connectivity (ODBC), will support the SQL Access Group Call Level API to provide a standard interface for relational data access. Digital will support the SQL Access API and ODBC through its SQL/Services Client API.

Digital will also support the Microsoft Message API (MAPI) with its NAS-based X.400 Mail products, and will use MAPI as the primary interface for future Windows message-enabled applications, i.e., TeamLinks. Digital will provide a Service Provider Interface (SPI) for WOSA that integrates MAPI with the Digital X.400 product. In reality, it will take about 18 months for the two companies to achieve full interoperability between their mail products.

Both companies also committed to adhere to the remote procedure call API contained within the OSF/DCE as the primary vehicle for distributed client/server communications. For Microsoft, this takes the form of the WOSA RPC, which is in the NT development kit. Digital's RPC will be in its DCE starter kit for Ultrix and OSF/1. RPC run-time will ship as a standard part of all Microsoft operating systems and on all NAS platforms.

Digital and Microsoft committed to supporting the WINsockets API, which provides transparent access to both DECnet/OSI and TCP/IP. Any new transports developed by Digital or Microsoft will provide inherent support for this API. Additionally, the POSIX subsystem on NT will support the X/Open transport interface standard, XTI. Digital supports XTI on OpenVMS and OSF/1.

Microsoft and Digital will also jointly market an SQL Server Gateway for Rdb/VMS that will allow Windows applications to access Rdb databases. The gateway is slated for release in early July.

Distributed Servers Meet the Desktop

Synchronization of NAS and WOSA represents the real meat of the alliance because it unites Microsoft and Digital in providing consistent methods of interoperating between the desktop and distributed servers of all sizes, wherever they may reside. Microsoft has often been criticized for not understanding large networks and enterprise applications, and Digital, for not understanding the desktop. To the extent that each company's weakness is the other's strength, there is significant opportunity for synergy.

On the other hand, some may argue that this arrangement between Microsoft and Digital will have no more impact on the industry than the involvement of these companies in the ACE Consortium. The key differences of this agreement are that real customers are involved and their data and application requirements are the focus. ACE was esoteric at best and quixotic at worst.

The Work Isn't Done

There is much that remains to be aligned between the two companies' architectures, however. Two important examples are their strategies for compound documents and object management, which are miles apart. Microsoft's Object Linking and Embedding (OLE) and Digital's Compound Document Architecture (CDA) will have to come closer together—document conversion is not a good enough answer. Microsoft and

Digital will also have to figure out how to bring Digital's Application Control Architecture (ACA) Services and DEC MessageQ into the Windows environment as well.

Service and Support at Your Fingertips

The third area of the agreement concerns Digital's providing expanded training and service and support to Microsoft customers. Microsoft will provide Digital with a blanket license for its Microsoft University training materials for use in Digital's 145 training centers around the world. Digital has already been supporting Microsoft applications and operating systems through its support organization. That support will be expanded to include NT on various platforms.

Digital's Management and Information Technology Consulting program and Systems Integration Services will work with Microsoft Windows Development and Architecture Design Consulting Services to provide assistance to customers in the areas of enterprise engineering, user-centered design, client/server computing, rightsizing, networking, databases, and graphical user interface design in open systems environments and global networks. Digital's Enterprise Integration Services program will work with users to customize Microsoft and Digital products to meet special requirements. Digital's 14 worldwide Customer Support Centers will offer Microsoft customers around-the-clock support by telephone.

Just Another Alliance?

This agreement is deceptive in its simplicity since there are no major shifts in corporate direction for either company. The agreement joins the forces of the number one software company and the number two hardware company to strengthen both of their respective positions in an increasingly competitive environment. With Apple allying with IBM on PowerPC, Taligent, and Kaleida; Lotus working with IBM on Notes and mail APIs; and HP and Sun collaborating on distributed objects, both Microsoft and Digital need the complementary strengths each brings to the agreement to avoid becoming isolated and having their strategic interfaces orphaned and deserted by the industry.

While the product outcomes of this agreement will barely be noticeable, the alignment of two distributed computing architectures around common—and, in many cases, standards-based—APIs will offer value to customers in their efforts to implement distributed, client/server applications. It will be interesting to watch the process of how the Northeast (Digital) and the Northwest (Microsoft) get their compasses pointing in the same direction. *—M. Goulde*

CONSORTIA FOCUS: ACE INITIATIVE

What Happened to ACE?

It didn't come as a complete surprise when Compaq Computer announced that it is dropping plans for the development of MIPS-based products and had withdrawn from the ACE Initiative. At the same time, another ACE founder, SCO, revealed that it has shelved its plans for developing OpenDesktop for ACE.

It appears that Compaq's customers were telling the company that they do not see a significant enough performance premium in MIPS-based desktop machines compared to newer Intel-based products and other Intel processors in the pipeline to warrant the adoption of a second architecture on the desktop. When ACE was formed, the gap between Intel performance and the design goal for the MIPS R4000 was significant enough to support the belief that a market for RISC PCs could be created based on a greater-than-100 percent performance advantage for the RISC processor.

Intel Awakens

In the interim, however, volume deliveries of the MIPS R4000 chip were delayed by nearly a year. The formation of the ACE Consortium and the success of 80386 clone chips from AMD and others caused Intel to wake up to the realization that it needed to become more aggressive both in price and performance, as well as in its responsiveness to customers.

Intel's response was to accelerate development of its advanced CISC processor designs and to add multiprocessing support and other high-performance features to designs already in progress in order to make its future generations of processors more attractive to customers like Compaq. These efforts will result in availability of the 80586 in late fall, a full quarter ahead of schedule. The next-generation Intel chip will offer price and performance equivalent to lower end RISC machines, such as the Sun Sparcstation 2. And Intel has already begun development on the next two generations after the 80586, with accelerated delivery schedules for those as well.

Intel's actions contributed to Compaq's reassessing the value of developing Advanced RISC Computer (ARC)-compliant machines based on the MIPS processors in

light of the cost of developing and manufacturing products based on a non-Intel architecture. The acquisition of MIPS by Silicon Graphics probably didn't help either. While Silicon Graphics and Compaq don't directly compete for much business, MIPS will no longer be the independent supplier of RISC technology that it was before the acquisition. A concern is that future generations of MIPS processors could carry optimizations to benefit Silicon Graphics' future product directions.

Compaq Still Likes Unix

This doesn't mean that Compaq is any less committed to Unix, NT, or higher-end systems, however. It will still design high-end servers and multiprocessor machines based on Intel processors and the EISA bus architecture. Compaq is evaluating various Unix offerings, and places a high premium on overall performance, support for multiprocessing, strong database performance, and applications availability. Unix clearly plays a server role for Compaq. It is not making a commitment on its selection of technology, although it has worked closely with SCO in the past. Even so, it will offer systems packaged with either Unix or NT. Nothing in Compaq's strategy changes, except its delivery of ARC-compliant RISC systems.

Or does it? Compaq would still like to have a broad range of systems to compete against Hewlett-Packard, Digital Equipment, and others who want to take over the PC server and workgroup database server markets with aggressively priced, high performance RISC servers. When Compaq was originally shopping for RISC technology, both Sun and HP pitched their processors to Compaq. Now there is Digital's Alpha to be considered. Rumors of Dell engaging in discussions with Taligent about adopting the PowerPC processor being developed jointly by IBM, Apple, and Motorola for workstation products could be the motivator to keep Compaq in the RISC game. While it is unlikely that Compaq would make a move before the end of 1992, we could see Compaq throwing in its lot with Digital again, just as it did with MIPS the first time.

Why Digital?

Digital and Compaq have complementary PC strategies. Digital is achieving unparalleled (for Digital) success selling PCs over the phone. It has kept its hands off the dealer channel, Compaq's historical bailiwick. Digital and Compaq, in conjunction with Microsoft, have a vested interest in seeing that Taligent faces stiff opposition. If Compaq bought Alpha processors from Digital, it would be able to offer a broad range of NT desktops along with a Unix offering. Compaq would be a real feather in Digital's Alpha cap, validating both the design and business practices at once. However, Compaq got burned once before by putting aside its conservative approach and coming out early to support a design that wasn't ready for market. This time around, it will wait until Alpha systems are shipping to customers before making any commitment.

And Where's SCO?

SCO's decision to put its MIPS development on the shelf and go back to concentrating on its Intel work was actually long overdue. However, with Compaq now out of the picture, SCO's primary partner in the ACE effort was now gone. Early signals of SCO's weakening position were felt around the time of the entry of USL into the ACE Consortium. This signaled a shift in the balance of power to SVR4, since most of the current suppliers of MIPS products would tend to stick with the USL brand of Unix. SCO found that it would have all it could handle keeping SVR4 in check on the Intel side without mounting a significant new effort with a new processor on a new operating system.

SCO's ACE project entailed porting Digital's OSF/1 implementation from the MIPS RS/3000 to the RS/4000 and then over to Intel. With Compaq out of the picture and NT and Alpha in, SCO could see little strategic value in continuing with ACE. Instead, SCO will stay with its SVR3.2 core technology for now, although it is evaluating new kernel technology for a future release. For the time being, SCO users will have to be satisfied with the recently announced enhancements in Release 2.0 of OpenDesktop.

ACE Not a Waste

While it may appear that ACE has now degenerated into disarray, it has actually served a very important purpose for the Unix industry. The ARC specification is a concept that corrects all of the faults with the PC hardware standard that supposedly exist. The notion of an Industry Standard Architecture is a myth, which anyone who has installed Microsoft Windows on a PC can attest to. PC compatibility has been defined as running everything from Lotus 1-2-3 to Flight Simulator. However, manufacturers have had free reign to play around with various aspects of PC hardware that make configuring advanced software, such as memory management, network software, drivers, and memory-resident applications, a game of shooting craps in the dark.

The ARC specification addressed those deficiencies by explicitly defining an architecture and a set of interfaces that would ensure an extremely high degree of

compatibility and "cloneability." It was the ARC specification that attracted Microsoft to ACE. The difference that standard hardware makes for a provider of shrinkwrapped operating system software is too great to be measured. Although Microsoft, too, was burned by the lateness of the R4000, the ARC specification is bound to live on in some form.

Unix Unification: The Real ACE

The agreement that brought USL into ACE signaled the ending of the Unix Wars. By agreeing to a set of higher level programmatic interfaces and support for OSF's DCE, USL initiated a new age in the Unix industry. The unification effort that began within ACE is still rippling through the industry. Even if ACE goes away tomorrow, it will always be remembered as the birthplace of unification. *—M. Goulde*

Letter to the Editor

System V.4 and OSF/1

I have reviewed your February 1992 article entitled "System V.4 and OSF/1." While I agree with your analysis of the technical aspects of these two systems, I feel that your readers would benefit from a wider perspective on the difference in current market positioning enjoyed by the two systems. I offer the following comments:

> UNIX System V Release 4 (SVR4) has been in the market, and shipping, for over two years. This compares with OSF/1, which has been shipping for less than a few months.
>
> SVR4 is currently shipping on 10 different machine architectures, including all major industry standard chips as well as proprietary processor types. To my knowledge, OSF/1 is currently supported on one proprietary architecture (DEC VAX).
>
> SVR4 represents a merger of SVR3, Xenix, and the Berkeley version of Unix, and supports applications from all of these systems. UNIX International's SVR4 catalogue identifies over 5,500 applications shipping today. OSF/1 is not such a merger, and therefore supports very few applications today.
>
> SVR4 is currently supported by over 60 hardware vendors and over 2,000 software vendors worldwide, which is orders of magnitude more than OSF/1. Recognizing the implications of this, OSF has publicly committed to support the SVR4 interfaces in a forthcoming release.

I hope this information is useful to you in your continued reporting of open systems issues. Keep up the good work.

David I. Sandel
Vice President, WorldWide Marketing
UNIX International

Editor's Comment: Actually, Dave, OSF/1 is not available for VAX but for MIPS-based DECstations. In addition, it is also available commercially from Intel and Kendall Square Research. Not that this gives it a commanding market presence, but it is real and not completely vaporware.

Your point about supporting SVR4 interfaces (as defined in System V Interface Definition Level 3) is particularly important. It appears that kernels are finally becoming less of a concern to vendors and users and that their importance is being replaced by system interfaces. While POSIX is the standard for system interfaces, de facto standards like SVID3 are often the way the market moves ahead because of the slowness of the formal standards process. —Editor

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